

Self life of Fruit

Shelf life of fruits

Shelf life is the length of time that a fruit may be stored without becoming unfit for use, consumption or sale.

Factors affecting shelf life on storage of fruits

1) Respiration: The more the respiration, the less the shelf life of fruits. Higher respiration leads to Rapid breakdown of carbohydrates to CO₂ and H₂O and it can be shown as follows-



Respiration rate is affected by the temperature, humidity, supply of O₂ and CO₂, maturity condition of fruits and its water, sugar and other food material content, higher concentration of sugar within the tissues, higher the rate of respiration. Tissue moisture have a direct relationship with the respiration rate.

2) Temperature and relative humidity: Temperature and relative humidity are the most important factors determining shelf life of fruits. If fruits are stored at low temperature and relative humidity, they will deteriorate within a very shortest possible time. Low temperature and high relative humidity increases shelf life of fruits. Both high temperature and high relative humidity are harmful for fruits as they increase respiration rate and also infestation by insect pest and pathogens.

3) Nutrients: Respiration rate increase, if fruits contain more sugar and water and so the fruits spoil very rapidly.

4) Supply of CO₂ and O₂ : Supply of more O₂ increases respiration rate. On the other, supply of CO₂ decreases respiration rate.

5) Wounds and bruises: Wounds and bruised fruits show high rate of respiration, as a result this fruits rot quickly and become unfit for consumption.

6) Type, cultivar and stage of maturity: Shelf life of fruits is dependent on the type, cultivar and stage of maturity. e.g. Ripe bael can be stored for long period but banana can be stored only for few days. Fruit coat plays great role in this respect. Again shelf life may vary depending the cultivar of the same fruit. e.g. In normal condition, shelf life of fazli mango is 2–3 days longer than other fruit.

7) Presence of pathogens and pests: Presence of pathogens has adverse effect on the shelf life of fruits. In High temperature and high humidity, pathogens infect fruits

severely. At high temperature and high humidity, the fruit are unfit for consumption within 2 days by insect pest. i.e. Fruit borer, cockroach, flies are wounds on the fruits and helps rotting of fruits.

Methods of Extension of shelf life of fruits

- Using growth regulators; NAA, GA3. e.g. Pineapple.
- By covering with polythene sheet. e.g. Banana.
- By hot water treatment. e.g. Mango.
- By covering with wax. e.g. Mango, Banana.
- By applying pesticides or fungicide. e.g. Litchi.
- Storage at low temperature and high moisture. e.g. Banana, Papaya, Pineapple.
- Reducing internal moisture content of fruits. e.g. Ber, Date, Grape, Apricot, Pear etc.
- By fumigation with Sulphur Dioxide (SO₂) gas. e.g. Litchi.
- By keeping in preservatives. e.g. Jam, Jelly, Pickle.
- By processing of fruits-
 - By Canning. e.g. Pineapple, Mango, Pear.
 - By fermentation. e.g. Grape.
 - By pasteurisation. e.g. Mango juice, Orange Juice.
- Preservation in refrigeration and deep freeze.
- Preservation in cold storage. e.g. Mango, Grape, Apple.
- Controlled on modified atmosphere storage. e.g. Pineapple, Papaya, Banana.
- By using hypobaric on sub-atmospheric storage method.
- By using various chemicals. e.g. KMnO₄, CaNO₃, CaCl₂. e.g. Guava.
- By using Ice ban cooling. e.g. Pear.
- By using evaporative cooling in cool chambers.

Physiological disorder of fruits

1. High temperature injury: Normally, high temperature is limited for each fruit and above this limit, metabolic activities are disturbed. As for example, the skin colour of Cavendish banana do not change above 30°C temperature and the Pulp of avocado become blackish temperature at 30°C.

2. Disorder due to atmospheric composition: The quality of fruits become deteriorate due to imbalance amount of O₂ and CO₂ in storage. Such as blackening of inner side of apple and cracking inner tissues of pear.

3. Disorder due to volatile compounds: Harmful affects occurs on fruit quality due to higher concentration of Ethylene. For example, yellowing or destruction of green colour.

4. Disorder due to mineral deficiency: Different disorders appears on different fruits due to deficiency of different mineral salts. As for example, soft nose of mango, cracking of cherry, Leaf tip burn of strawberry, blossom and rot of water melon and lenticel blotch and cork spot of apple etc. Symptoms are appear due to deficiency of calcium.

5. Chilling injury: Chilling injury is a physiological disorders of plant tissues which are generally appears in tropical and subtropical plants. Chilling injury appears when sensitive tissues may kept below 15°C temperature, although critical temperature varies from fruits to fruits. Although there is a marked variation of critical temperature of different fruits.

Spoilage

Spoilage of fruit means damage or decay or rotten of fruits due to unfavorable condition from harvesting to consumption.

Causes of spoilage of fruit

Different factors are responsible for spoilage of fruits which are given below-

A. Biological factor

- Microorganism such as fungi, bacteria etc.
- Insects such as fruit borer, fruit fly etc.

B. Physiological factors

- **Respiration:** The more the respiration, the less the shelf life of fruits. i.e. spoilage of fruits occurs quickly. Higher respiration leads to Rapid breakdown of Carbohydrates to CO₂ and H₂O and it can be shown as follows-



- **Transpiration:** Transpiration also affected spoilage of fruits. High temperature is directly related to transpiration and reduces shelf life of fruits. i.e. Spoilage of fruits occurs.

C. Physical factors

- **Supply of O₂ and CO₂** : Supply of more oxygen increases respiration rate. On the other, supply of carbon dioxide decreases respiration rate. So it is observed that shelf life. i.e. spoilage of fruits is mostly indirectly dependent on the supply O₂ and CO₂.
- Presence of unfavourable storage condition has high temperature, low humidity and lack of ventilation.

D. Others factors

- Defective harvesting and storage system.
- Stages of maturity of fruits at harvesting time.
- Types of fruits.
- Varieties.
- Composition of fruits.
- Wounds and bruises.
- Improper transportation.
- Rough handling.
- The ripe and unripe fruits kept together.
- Lack of organised system.

Remedies of spoilage of fruits

1. Fruits should be washed with water and wiped with towel and air dried, then they should be dipped in hot water at 55°C for 5 minutes. Benomil, Benlate etc may or may not be used in hot water.
2. Insecticide at a low dose should be sprayed on the fruits.
3. Fruits should be properly stored at low temperature followed by high relative humidity (85-90% humidity).
4. Fruits should be sorted out from the blemish fruits. Only the good or unblemished fruits should be selected for storage.
5. Fruit should be harvested at optimum stage of maturity and by proper method.